J.R. SIMPLOT COMPANY P.O. BOX 460 ABERDEEN, IDAHO 83210 (208) 397-4121

FOOD GROUP

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Department of Environmental Quality
State Air Program

January 11, 2008

**CERTIFIED MAIL: 7004 2890 0004 4611 8226**

Mr. Bill Rogers
Department of Environmental Quality
Air Quality Division
Stationary Source Program
1410 North Hilton
Boise, Idaho 83706-1255

Subject: Nebraska Boiler Biogas Burner PTC Application
J.R. Simplot Company – Aberdeen Facility
Aberdeen, Idaho

Dear Mr. Rogers:

This Permit to Construct (PTC) application describes the J.R. Simplot Company's (Simplot's) proposed biogas burner project for the Aberdeen facility's Nebraska boiler. As detailed in the application, this project will affect only the Nebraska boiler. The enclosed application contains all of the information required by IDAPA 58.01.01.200, including DEQ's standard forms, emission calculations, and a description of the dispersion modeling analysis that supports the application. A compact disk that contains the modeling files supporting the PTC application will be mailed directly to Mr. Kevin Schilling at IDEQ.

Simplot will be hand delivering the requisite $1,000 PTC application filing fee to IDEQ independent of the PTC application. Simplot understands DEQ will invoice the Aberdeen facility for the final PTC processing fee after issuance of the PTC.

Additionally, with this submittal, Simplot requests the opportunity to review a copy of the draft PTC prior to the public comment period. Once the draft PTC is complete, please provide copies to Henry Hamanishi (henry.hamanishi@simplot.com) and Kelly Packard (Kelly.packard@simplot.com).

If you have any questions or concerns regarding the biogas burner PTC application, please do not hesitate to contact the Aberdeen facility's Environmental Manager, Kelly Packard, at 208-397-2508.

In accordance with IDAPA 58.01.01.123, I hereby certify that, based on information and belief formed after reasonable inquiry, the statements and information in this application are true, accurate, and complete.

Sincerely,

Bruce Hauber

Bruce Hauber
Aberdeen Facility Unit Director
J.R. Simplot Company

cc: Kelly Packard, J.R. Simplot Company
Henry Hamanishi, J.R. Simplot Company
Eric Hansen, Geomatrix

# Biogas Burner Permit to Construct Application
# J.R. Simplot Company

Aberdeen, Idaho

Prepared for:

**J.R. Simplot Company**
P.O. Box 460
Aberdeen, Idaho 83210

January 2008

Project No. 14018.000.0

# Biogas Burner Permit to Construct Application
# J.R. Simplot Company

Aberdeen, Idaho

Prepared for:

**J.R. Simplot Company**
Aberdeen, Idaho

Prepared by:

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(425) 921-4000

January 2008

Project No. 14018.000.0

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### APPENDIXES

# PERMIT TO CONSTRUCT APPLICATION FOR NEBRASKA BOILER BIOGAS BURNER

J.R. Simplot Company – Aberdeen Facility
Aberdeen, Idaho

## 1.0 INTRODUCTION

The J.R. Simplot Company (Simplot) has owned the Aberdeen potato processing facility for more than 30 years. The Aberdeen facility produces a variety of potato products, including pre-formed par fried potatoes, French-fried par fried potatoes, as well as fried corn products. The Aberdeen facility is situated on approximately 40 acres of primarily agricultural land located roughly one-half mile east of Aberdeen. Figure 1-1 displays the site location while Figure 1-2 provides a scaled site plan. Although there are variations in production and work schedules, the Aberdeen facility operates 24 hours per day, seven days per week, and up to 52 weeks per year.

In 2003 Simplot submitted a Permit to Construct (PTC) application for an anaerobic digester, a flare to control the digester's biogas emissions, and a hot water heater to heat the digester's influent. Simplot began operating this equipment in 2006. In addition to flaring the biogas or using it to heat the digester's influent by burning it in the hot water heater, Simplot proposes to add the capability to route the biogas to the production facility's Nebraska boiler to offset the quantity of natural gas Simplot purchases. Simplot proposes to install an additional burner in the existing Nebraska boiler to allow it to combust the digester's biogas. The proposed project would not increase the boiler's design heat input capacity or steam production rate, nor will it affect any other equipment at the facility. The proposed project will reduce the quantity of natural gas that Simplot purchases for the Nebraska boiler.

Simplot requests that the Department of Environmental Quality (DEQ) revise the Nebraska boiler's PTC (PTC P-040318, issued December 3, 2004) to incorporate the proposed biogas burner. This application demonstrates that Simplot can operate the modified boiler continuously without violating any regulations, and without causing or significantly contributing to a violation of any ambient air quality standards.

Appendix A contains DEQ's standard PTC Forms CS, GI, EU5, FRA, EI, and MI.

## 2.0 PROJECT DESCRIPTION

### 2.1 EXISTING FACILITY

The facility consists of one main production building and a number of smaller structures. These structures include raw potato storage warehouses, cold storage warehouses, a steam generating plant, and various other buildings.

The main production building houses all of the processing equipment; however, the entire facility is involved in generating the finished potato products. Potato product production generally consists of the following major steps:

- Receiving and unloading of raw potatoes
- Sorting and seasonal inspection
- Cleaning and peeling
- Cutting and culling of potato pieces
- Blanching (potatoes are dipped in hot water)
- Drying
- Frying
- Freezing
- Packaging
- Product shipping

Raw potatoes are delivered to the facility by trucks and unloaded into the enclosed storage and receiving buildings. Inside the receiving area, potatoes are pushed from storage piles into a water 'flume' system that is used to wash and transport the potatoes. The potatoes are first mechanically sorted by size and, during harvest time, the potatoes are also randomly inspected by the Idaho Department of Agriculture.

After sorting and inspection, the potatoes are transported by flume to one of the facility's two production lines. At the beginning of each production line, the steam peelers remove the peels before the potatoes are transported, by flume, to the cutting decks. The cutting decks slice the potatoes into various shapes and lengths.

After the potatoes are cut and sorted into different lengths, they are dipped into hot water blancher tanks to remove the excess sugars. The potato products for Line 1 are then conveyed to the facility's only dryer to remove surface moisture. The Aberdeen facility's Line 1 dryer is one large unit that is divided into four zones using internal baffles; each zone is heated with a five million British thermal units per hour (MMBtu/hr) natural gas-fired burner. Once the surface moisture is removed, the potatoes are conveyed to the Line 1 fryer system. Potatoes from the Line 2 blancher are either sent directly to the Line 2 fryer or formed into preformed potato products before being conveyed to the Line 2 fryer. Each of the two fryer lines includes a fryer system, an oil mizer (for oil recovery back to the process), and an oil filter. Both of the fryer systems vent to the facility's wet electrostatic precipitator (WESP) to minimize air emissions. Following the frying process, the final potato products are frozen and packed for shipping.

The Aberdeen facility has two processing lines, designated Lines 1 and 2. Line 1, which primarily processes French fries, consists of a blancher, a dryer, and a two-stage fryer system. However, Line 2, which primarily processes preformed fried products and corn fries, consists of only a blancher and fryer. The Line 2 fryer also receives corn meal products from the corn meal extruder.

The facility's 80 MMBtu/hr Nebraska boiler generates the steam used to heat the facility's blanchers, peelers, and fryer systems. DEQ issued a permit (P-040318) for the boiler installation in December 2004, and the new boiler became operational January 2, 2005. The Nebraska boiler is currently permitted to combust only natural gas.

To maintain a consistent indoor air temperature of 65° to 70°F from the receiving areas to the final packaging area, Simplot has installed nine natural gas-fired air makeup units (AMUs) for use during the winter. These heaters do not provide any process heat; they are solely intended to provide comfort heat for the employees and they discharge directly into the building.

The Aberdeen facility also employs an anaerobic digester to improve the facility's wastewater treatment capabilities prior to discharging process water to the facility's agricultural lands. The anaerobic digester is accompanied by a flare to combust biogas before it is vented to atmosphere, as well as a 4.95 MMBtu/hr natural gas or biogas-fired hot water heater to heat the digester's influent. DEQ issued the construction approval for this equipment on October 9, 2003 and the final PTC, PTC P-030318, on July 28, 2004. Simplot began operating this equipment in 2006.

Figure 2-1 presents a process flow diagram for the facility.

## 2.2 PROPOSED PROJECT

The proposed project will give the Aberdeen facility's Nebraska boiler the capability to burn either 100 percent natural gas, or a mixture of natural gas and biogas. The boiler is currently equipped with a ring burner for only natural gas. Simplot proposes to install a 'gun' burner in the middle of the ring burner to give the boiler the capability to also combust biogas. Assuming the digester produces biogas at its maximum rate for an entire year, and Simplot combusts all of the biogas in the Nebraska boiler, the biogas would offset the boiler's natural gas usage by approximately 9 to 10 percent on an annual basis.

The proposed project will not increase the digester's biogas production rate, and the proposed project will not increase the Nebraska boiler's maximum heat input capacity or its potential or actual steam production.

PTC P-030318 allows biogas to be fired in only the digester's hot water heater or the digester's flare. Simplot proposes to retain the capability to combust biogas in these two sources, as well as route the biogas to the Nebraska boiler. On an hourly and annual basis, the Nebraska boiler will be capable of combusting all of the biogas the digester produces. After implementation of this project, Simplot will be able to combust biogas in three different sources at the facility: the Nebraska boiler, the biogas flare, and the hot water heater.

The proposed project will not affect the facility's fryers, dryers, AMUs, waste water treatment plant, or anaerobic digester.

### 2.3 PROPOSED PERMIT REVISIONS

Simplot proposes the following revisions to PTC P-040318, the Nebraska boiler PTC:

- Section 1.1, Table 1.1, and Section 2.6 – add 'biogas' to the Nebraska boiler's list of allowable fuels.

- Section 2.8 – add 'biogas' to the fuel-use monitoring requirement.

After reviewing the digester, flare, and hot water heater PTC (PTC-030318, issued July 28, 2004), Simplot contends this PTC does not need to be revised as a result of this project. Rather, Simplot proposes that DEQ include text in the Technical Support Document for the revised Nebraska boiler PTC that states the Nebraska boiler's sulfur dioxide ($SO_2$) potential to emit (PTE) is included in the combined $SO_2$ PTE for all 'biogas-burning systems', including the flare, the hot water heater, and the Nebraska boiler.

However, if DEQ determines it is necessary to revise PTC-030318, Simplot proposes the following:

- Sections 2.1 and 2.7 – add the Nebraska boiler to the list of sources that combust biogas.

- Section 2.3 – include the Nebraska boiler in the $SO_2$ emission limit, and revise the limit to 26.5 tons per year due to the Nebraska boiler's $SO_2$ emissions attributable to natural gas combustion.

- Tables 3.1 and 4.1 – revise the table to include the Nebraska boiler as a source that combusts biogas, and revise the limit to 26.5 tons per year due to the Nebraska boiler's $SO_2$ emissions attributable to natural gas combustion.

## 3.0 EMISSION SOURCES AND CALCULATIONS

The proposed biogas burner project will affect only the Nebraska boiler's PTE. Due to the biogas's composition, the proposed project will increase the Nebraska boiler's criteria pollutant, toxic air pollutant (TAP), and hazardous air pollutant (HAP) PTE. No other emission unit's PTE will be affected by this project.

To determine the Nebraska boiler's PTE after implementation of the biogas burner project, Geomatrix examined two operational scenarios:

1. Nebraska boiler combusting 100 percent natural gas, and

2. Nebraska boiler combusting a mixture of natural gas and biogas[1].

### 3.1 NEBRASKA BOILER COMBUSTING NATURAL GAS

Geomatrix used AP-42, Section 1.4 emission factors to calculate the Nebraska boiler's criteria pollutant, TAP, and HAP PTE attributable to 100 percent natural gas combustion. Table 3-1 presents the boiler's criteria pollutant PTE while Table 3-2 presents its TAP and HAP PTE. These emission rates are unchanged from the Nebraska boiler's PTC.

### 3.2 NEBRASKA BOILER COMBUSTING A NATURAL GAS AND BIOGAS MIXTURE

Geomatrix used AP-42 emission factors and process information to calculate the Nebraska boiler's PTE attributable to combustion of the natural gas/biogas mixture. Based on the heat content of the facility's biogas and the quantity of biogas generated per day, Simplot calculated the maximum heat input the Nebraska boiler could derive from biogas, 4.2 MMBtu/hr. Therefore, the majority of the boiler's heat input and emissions will be attributable to natural gas combustion, even when combusting the fuel mixture.

#### 3.2.1 Natural Gas Combustion

Geomatrix used AP-42, Section 1.4 emission factors to calculate the boiler's criteria pollutant, TAP, and HAP PTE attributable to the natural gas portion of the fuel mixture.

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[1] To be conservative, Geomatrix assumed the anaerobic digester would produce biogas at its maximum rate, the Nebraska boiler would combust all of the biogas, and the remainder of the boiler's heat input capacity would be derived from natural gas.

### 3.2.2 Biogas Combustion

Approximately 65 percent of the digester's biogas is combustible methane, a small fraction is hydrogen sulfide ($H_2S$), and the remainder is carbon dioxide, an incombustible gas. Because the combustible portion of the biogas is similar to natural gas, Geomatrix used emission factors from AP-42 Section 1.4 to provide the basis for the NOx, carbon monoxide (CO), volatile organic compound (VOC), particulate matter ($PM_{10}$), TAP, and HAP emissions attributable to biogas combustion.

To account for the incombustible portion of the biogas in the emission calculations, Geomatrix adjusted the biogas flow rate by 35 percent. Geomatrix combined the 'modified' biogas flow rate with the NOx, CO, VOC, $PM_{10}$, TAP, and HAP emission factors from AP-42 Section 1.4. Because biogas has lower heat content than natural gas, generating the same heat input requires more biogas than natural gas. Accordingly, emission rates attributable to firing biogas are higher than natural gas because the emission factors in AP-42 Section 1.4 are in units of 'pound of pollutant per million standard cubic feet of gas'.

Geomatrix used process data provided by Simplot to calculate the $SO_2$ emissions attributable to biogas combustion. Simplot calculated the maximum $H_2S$ concentration in the biogas using the physical characteristics of the waste water, including sulfur content, temperature, conductivity, and chemical oxygen demand (COD). Simplot's $H_2S$ calculations are included in Appendix B. For the $SO_2$ emission calculations in Appendix B, Geomatrix assumed that 100 percent of the biogas $H_2S$ will be converted to $SO_2$ in the boiler's combustion chamber.

Table 3-1 presents the Nebraska boiler's criteria pollutant PTE attributable to combustion of the fuel mixture, while Table 3-2 presents the boiler's TAP and HAP PTE attributable to combustion of the fuel mixture.

Appendix B provides detailed emission calculations for the Nebraska boiler combusting natural gas and the fuel mixture.

## 3.3 FACILITY-WIDE POTENTIAL TO EMIT

Combusting biogas in the Nebraska boiler will increase the boiler's criteria pollutant, TAP, and HAP PTE. Although the boiler's $SO_2$ PTE will increase by 26 tons per year, the facility's $SO_2$ PTE will remain unchanged. The anaerobic digester is capable of generating a finite amount of biogas. This proposed project simply allows Simplot to combust the available biogas in a different piece of equipment.

The facility-wide PTE of the other criteria pollutants, TAPs, and HAPs will increase by the same amount as the Nebraska boiler's PTE.

The PTE increases attributable to the proposed biogas burner project will not cause the Aberdeen facility's PTE to cross any regulatory thresholds. Appendix B presents a summary of the facility-wide PTE and detailed emission calculations for the facility's other sources.

## 4.0 POTENTIALLY APPLICABLE REGULATIONS

The Aberdeen facility and the biogas burner project are subject to federal and state air pollution control regulations. This section discusses each applicable regulation and details why other federal and state regulations are not applicable.

## 4.1 FEDERAL REQUIREMENTS

### 4.1.1 National Emission Standards for Hazardous Air Pollutants

EPA has established a National Emission Standard for Hazardous Air Pollutants (NESHAP) under 40 CFR 63 to regulate HAP emissions from industrial boilers. However, that standard does not apply to the Aberdeen facility because the facility is not currently a major source of HAPs and the proposed project will not cause the facility to become a major source of HAPs.[2]

### 4.1.2 New Source Performance Standards

EPA has established New Source Performance Standards (NSPS) for new, modified, or reconstructed facilities and source categories. NSPS Subpart Dc applies to boilers that meet a heat input requirement (greater than 10 MMBtu/hr but less than 100 MMBtu/hr) and were built, modified (as defined by NSPS rules), or reconstructed after June 9, 1989, the Subpart's applicability date. Boilers that meet these criteria must meet the requirements contained in Subpart Dc. The Nebraska boiler is rated at 80 MMBtu/hr and was built after the applicability date. Therefore, the Nebraska boiler is subject to the requirements of NSPS Subpart Dc. The proposed biogas burner project will not affect the boiler's applicability status; however the project will be considered a 'modification' for the purposes of NSPS. Accordingly, Simplot will submit the requisite notification as detailed in 40 CFR 60.7(4). As noted in Section 2, following implementation of the project Simplot will be required to monitor and record the quantity of biogas burned in the Nebraska boiler.

Subpart Dc does not apply to the anaerobic digester's hot water heater. Although the heater combusts natural gas at least some of the time, the heater's rated heat input capacity is below the applicability threshold.

### 4.1.3 Prevention of Significant Deterioration

Potato processing facilities are not designated facilities under 40 CFR 52.21(b). Consequently, potato processing facilities are deemed minor sources for the purposes of the Prevention of Significant Deterioration (PSD) program unless emissions of a regulated pollutant exceeds 250

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[2] See Appendix B for supporting information.

tons per year. The facility's PTE of regulated pollutants is less than the 250 ton major source threshold. Accordingly, the Aberdeen facility is not a major source under the PSD program.

#### 4.1.4 Title IV Acid Rain Provisions

Title IV of the federal Clean Air Act regulates sulfur dioxide and oxides of nitrogen emissions from fossil fuel-fired electrical generation facilities. The Aberdeen facility's boilers combust natural gas, however the Aberdeen facility does not generate electricity. Accordingly, Simplot's Aberdeen facility is not subject to the Title IV Acid Rain Provisions in the Clean Air Act.

#### 4.1.5 Title V Operating Permit

Title V of the federal Clean Air Act requires facilities with the potential to emit more than 100 tons of a regulated criteria pollutant, 10 tons of a single HAP, or 25 tons of all HAP combined on an annual basis to obtain a Title V Operating Permit. EPA delegated this regulatory program to DEQ. As demonstrated by the facility-wide emission inventory in Appendix B, the Simplot-Aberdeen facility is not a major source for the purposes of the Title V program.

#### 4.1.6 Compliance Assurance Monitoring

EPA established the Compliance Assurance Monitoring (CAM) program to regulate emission sources that employ a control device to maintain compliance with an enforceable emission limit. 40 CFR Part 64.2 establishes the three applicability criteria for the CAM program:

- The unit is subject to an emission limit,
- The unit uses a control device to achieve compliance with that limit, and
- The unit has pre-control emissions of 100 percent of the major source threshold.

As detailed in the Aberdeen facility's November 2003 Tier I Operating Permit application, none of the facility's emission units are subject to CAM.

The biogas burner project will not subject the Nebraska boiler to CAM because the boiler is not equipped with an emissions control device and its pre-control remissions are less than the major source threshold.

### 4.2 STATE REQUIREMENTS

#### 4.2.1 Permit to Construct Program

DEQ's PTC regulations require all facilities to obtain a PTC or a documented exemption determination before beginning construction of a new source of air pollution or modifying an existing source in a manner that would cause its emissions to increase. Simplot has worked with DEQ to establish approval for all of the air pollution sources at the Aberdeen facility. This document complies with the PTC program requirements for the proposed biogas burner project.

### 4.2.2 Tier I Operating Permit

As described previously, the Aberdeen facility is not subject to the Title V/Tier I Operating Permit program.

### 4.2.3 Toxic Air Pollutant Regulations

Several of the pollutants attributable to the proposed biogas burner are identified as TAPs in IDAPA 58.01.01.585 and 586. These rules establish a Screening Emission Level as well as an Acceptable Ambient Concentrations or an Acceptable Ambient Concentrations for Carcinogens for each TAP. Project-specific TAP PTE increases that exceed the applicable Screening Emission Level must be modeled to demonstrate that the facility does not exceed the TAP specific Acceptable Ambient Concentration or Acceptable Ambient Concentration for Carcinogen. None of the TAP emission increases associated with the proposed biogas burner project will exceed the applicable Screening Emission Levels. Therefore, no TAP dispersion modeling was required for this project. Additional detail is provided in the dispersion modeling report, which is found in Section 5.

### 4.2.4 General Requirements

The only state requirements directly applicable to the project are rules that address general air quality issues, including:

- opacity [IDAPA 58.01.01.625]
- grain loading standard for new sources combusting natural gas, 0.015 grains per dry standard cubic foot (gr/dscf) corrected to three percent oxygen [IDAPA 58.01.01.676]

## 5.0 DISPERSION MODELING ANALYSIS

The potential criteria pollutant emission increases for the proposed Nebraska boiler project are compared to the applicable modeling de minimis thresholds in Table 3-1, and the potential TAP emission rate increases for the proposed Nebraska boiler project are compared to the applicable screening emission levels (SELs) in Table 3-2. The only calculated project-specific emission rate increase greater than the applicable modeling de minimis threshold is for $SO_2$ and none of the potential TAP emission rate increases are greater than the applicable SELs. Consequently, Geomatrix preformed dispersion modeling analyses for only $SO_2$ on a 3-hour, a 24-hour, and an annual average basis.

Geomatrix submitted a dispersion modeling protocol to DEQ on January 2, 2008 and DEQ approved the modeling protocol on January 8, 2008. The modeling protocol approval is provided as Appendix C. A compact disk containing the air quality modeling input files is included in Appendix D.

### 5.1 DISPERSION MODEL SELECTION

AERMOD is identified by the EPA's *Guideline on Air Quality Models* (codified as Appendix W to 40 CFR Part 51) as the preferred dispersion model for complex source configurations and for sources subject to building downwash. The latest version of the EPA regulatory model AERMOD (Version 07026) was used for the dispersion modeling analysis.

### 5.2 DISPERSION MODEL INPUTS

#### 5.2.1 Emission Rates

The proposed project affects the Nebraska boiler's potential to emit $SO_2$, but facility-wide potential $SO_2$ emissions do not change because the flare and the hot water heater are already permitted to burn all of the biogas generated by the facility's anaerobic digester. Geomatrix completed two dispersion modeling analyses for the proposed project: a significant impact analysis (SIA) and a full impact analysis (FIA). The SIA modeling exercise includes only the boiler-specific $SO_2$ emission rate increase due to the proposed project (presented in Table 3-1). AERMOD results for the SIA are compared to applicable significant contribution levels (SCLs) in Table 5-3. A FIA is required for $SO_2$ because the highest AERMOD-predicted concentrations are greater that the applicable SCLs for $SO_2$.

The FIA modeling exercise addresses only the facility-wide potential $SO_2$ emissions. A total of 14 point sources were used to represent the facility-wide $SO_2$ emissions. Geomatrix conservatively modeled the Nebraska boiler, the flare, and the hot water heater each simultaneously burning biogas at the digester's maximum production rate (155,500 scf biogas/day) to reduce the total number of FIA modeling scenarios and the overall model runtime[3].

The Aberdeen facility's nine air makeup units (AMUs) are located in the main production building and vent directly into the building rather than to the atmosphere through individual exhaust vents. There are six powered exhaust fans on the main production building that pull air from inside the facility and vent the air to atmosphere. For modeling purposes, Geomatrix split the AMUs' potential emissions equally between the six plant vents.

Geomatrix completed AERMOD simulations for the SIA and the FIA modeling analyses using the calculated $SO_2$ emissions increase due to the proposed project (presented in Table 3-1) and the maximum facility $SO_2$ emission rates for all of the sources at the Aberdeen facility, as shown in Appendix B.

### 5.2.2 Stack Parameters and Building Configuration

Figure 5-1 shows the site plan of the Aberdeen facility with the locations of the point source stacks as well as significant structures that could potentially influence downwash from the stacks. The Nebraska boiler is equipped with two economizers, each with its own stack. Based upon process needs in the facility, Simplot varies the amount of boiler exhaust that is routed through each economizer. Because of the variations in exhaust flow and the exhaust temperature, the two stacks have multiple combinations of exit velocities, exit temperature, and emission rates. Geomatrix modeled three different Nebraska boiler exhaust scenarios, including:

1. 100 percent boiler exhaust through traditional boiler economizer;
2. 50 percent boiler exhaust through traditional boiler economizer and 50 percent boiler exhaust through condensing economizer; and
3. 100 percent boiler exhaust through condensing economizer.

[3] At its maximum design rate, the digester produces 155,500 scf of biogas per day. It is not physically possible for the Nebraska boiler, the biogas flare, and the hot water heater to simultaneously combust biogas at the digester's maximum biogas production rate.

The stack parameters for the three exhaust scenarios, including the release parameters for all other $SO_2$ emission sources at the Aberdeen facility, are summarized in Table 5-1. Horizontal stack releases are given an exit velocity of 0.001 m/s to represent no plume rise due to momentum and an exit diameter of 0.001 m to prevent the effects of stack-tip downwash on a horizontal stack. Table 5-1 also provides justification of the stack parameters, specifically stack exhaust flowrates and stack exhaust temperatures, used in the modeling analyses.

In addition to the stack locations, the existing building locations and dimensions were provided to AERMOD to assess potential downwash effects. Wind direction-specific building profiles were prepared for modeling by using the EPA's Prime version of the Building Profile Input Program (BPIP PRIME). The facility layout and building elevations, provided by Simplot, were used to prepare the data input file for BPIP PRIME, which then provides AERMOD with necessary building downwash parameters. Table 5-2 presents the heights of all buildings included in the dispersion modeling analysis.

### 5.2.3 Elevation Data and Receptor Network

Terrain elevations for receptors and emission sources were prepared using digital elevation models (DEMs) developed by the United States Geological Survey (USGS) of nine 7.5-minute quadrangles obtained from the internet (http://mapmart.com): Aberdeen, American Falls, American Falls NW, American Falls SW, Big Fill Reservoir, Coffee Point SW, Schiller, Springfield, and Wheatgrass Bench. These data have a horizontal spatial resolution of 10 meters (m).

For the dispersion modeling analysis, receptors were spaced 250 meters apart covering the entire 10-km square modeling domain, with a nested 2.5-km by 2.5-km grid with 50 meter receptor spacing, and a nested 500-m by 500-m grid with 25 meter receptor spacing centered on the Aberdeen facility. The receptor spacing along the facility boundary is 10 meters. The final receptor locations are shown in Figure 5-2. The base elevation and hill height scale for each receptor were determined using the EPA's terrain processor AERMAP (Version 06341). AERMAP generates a receptor output file that is read by AERMOD.

### 5.2.4 Meteorological Data

Geomatrix used a five-year meteorological database that was constructed using available surface and upper air data for the dispersion modeling analysis. A meteorological data set was prepared using the Idaho National Laboratory (INEEL) station in Aberdeen, Idaho with missing data supplemented by National Weather Service (NWS) surface observations from Pocatello

Regional Airport and upper air data observations from the Boise Airport for the period 2001 – 2005. A wind rose presenting wind speed and wind direction data for the five year period is shown in Figure 5-3. The wind rose shows winds predominantly from the southwest and north-northeast directions following the Snake River valley. The average wind speed is 4.06 meters per second (m/s); and calm conditions occur less than 0.16 percent of the time.

Additional meteorological variables and geophysical parameters are required for use in the AERMOD dispersion modeling analysis to estimate the surface energy fluxes and construct boundary layer profiles. Surface characteristics including the surface roughness length, albedo, and Bowen ratio were assigned on a sector-by-sector basis using land use within three kilometers of Aberdeen meteorological site. The USGS 1992 National Land Cover (NLCD92) land use data set used in the analysis has a 30 m mesh size and over 30 land use categories.[4]

The NLCD92 data were processed using the utilities that accompany the CALPUFF modeling system. Annual average land-use was characterized in 12 upwind sectors surrounding the Aberdeen meteorological site. Following MAKEGEO land use processing methods, arithmetic averages were used for the albedo and Bowen ratio, while a geometric or logarithmic average was used for surface roughness length. This land-use analysis and corresponding surface roughness lengths, albedo, and Bowen ratios are shown in Figure 5-4.

The EPA meteorological program AERMET (Version 06341) was used to combine the surface meteorological observations with twice daily upper air soundings from Boise Airport and to derive the necessary meteorological variables for AERMOD. AERMET uses the upper air data to predict the development of the mixed layer height. The Bulk-Richardson option is used to estimate dispersion variables and surface energy fluxes during nocturnal periods, while solar radiation and wind speed are used by AERMET to estimate these same variables during the day.

### 5.3 DISPERSION MODEL RESULTS

The maximum modeled increases in ambient $SO_2$ concentrations for the SIA and FIA modeling analyses and the applicable $SO_2$ SCLs, background concentrations, and NAAQS are shown in Table 5-3. The AERMOD FIA analysis indicates that ambient $SO_2$ concentrations attributable to facility wide emissions plus background concentrations are below the applicable NAAQS.

[4] The USGS NLCD92 data set is described and can be accessed at http://landcover.usgs.gov/natllandcover.php.

# TABLES

## TABLE 3-1

## EXISTING AND PROPOSED NEBRASKA BOILER CRITERIA POLLUTANT POTENTIAL TO EMIT

Simplot – Aberdeen
Aberdeen, Idaho

| Pollutant | Existing Nebraska Boiler Potential to Emit[1] | | Proposed Nebraska Boiler Project Potential to Emit [2] | | Change in Potential Emissions | | Modeling De Minimus Thresholds [3] | |
|---|---|---|---|---|---|---|---|---|
| | (lb/hr) | (TPY) | (lb/hr) | (TPY) | (lb/hr) | (TPY) | (lb/hr) | (TPY) |
| NOx | 3.81 | 16.69 | 4.03 | 17.65 | 0.22 | 0.97 | -- | 1 |
| CO | 6.40 | 28.03 | 6.42 | 28.11 | 0.02 | 0.07 | 14 | -- |
| $SO_2$ | 0.05 | 0.20 | 6.05 | 26.49 | 6.00 | 26.29 | 0.2 | 1 |
| $PM_{10}$ | 0.58 | 2.54 | 0.58 | 2.54 | 0.00 | 0.01 | 0.2 | 1 |
| VOC | 0.42 | 1.84 | 0.42 | 1.84 | 0.00 | 0.00 | -- | -- |

1 – Based on the Nebraska boiler combusting 100 percent natural gas.

2 – Based on the Nebraska boiler combusting a natural gas/biogas fuel mixture.

3 – Modeling thresholds from Table 1 of the State of Idaho Air Quality Modeling Guideline (Doc. I D AQ-011 (rev. 1 12/31/02)).

## TABLE 3-2

## EXISTING AND PROPOSED NEBRASKA BOILER TAP AND HAP POTENTIAL TO EMIT

Simplot – Aberdeen
Aberdeen, Idaho

| Toxic Air Pollutants | Existing Nebraska Boiler Potential to Emit[1] | | Proposed Nebraska Boiler Project Potential to Emit[2] | | Change in Potential Emissions | | Screening Emission Levels [3] |
|---|---|---|---|---|---|---|---|
| | (lb/hr) | (TPY) | (lb/hr) | (TPY) | (lb/hr) | (TPY) | (lb/hr) |
| 3-Methylchloranthrene | 1.37E-07 | 6.01E-07 | 1.38E-07 | 6.02E-07 | 3.61E-10 | 1.58E-09 | 2.50E-06 |
| Benzene | 1.60E-04 | 7.01E-04 | 1.60E-04 | 7.03E-04 | 4.21E-07 | 1.84E-06 | 8.00E-04 |
| Benzo(a)pyrene | 9.14E-08 | 4.00E-07 | 9.17E-08 | 4.02E-07 | 2.41E-10 | 1.05E-09 | 2.00E-06 |
| Dichlorobenzene | 9.14E-05 | 4.00E-04 | 9.17E-05 | 4.02E-04 | 2.41E-07 | 1.05E-06 | 30 |
| Formaldehyde | 5.71E-03 | 2.50E-02 | 5.73E-03 | 2.51E-02 | 1.50E-05 | 6.59E-05 | 5.10E-04 |
| Hexane | 1.37E-01 | 6.01E-01 | 1.38E-01 | 6.02E-01 | 3.61E-04 | 1.58E-03 | 12 |
| Naphthalene | 4.65E-05 | 2.04E-04 | 4.66E-05 | 2.04E-04 | 1.22E-07 | 5.36E-07 | 3.33 |
| Pentane | 1.98E-01 | 8.68E-01 | 1.99E-01 | 8.70E-01 | 5.21E-04 | 2.28E-03 | 118 |
| Toluene | 2.59E-04 | 1.13E-03 | 2.60E-04 | 1.14E-03 | 6.82E-07 | 2.99E-06 | 25 |
| Arsenic | 1.52E-05 | 6.67E-05 | 1.53E-05 | 6.69E-05 | 4.01E-08 | 1.76E-07 | 1.50E-06 |
| Barium | 3.35E-04 | 1.47E-03 | 3.36E-04 | 1.47E-03 | 8.82E-07 | 3.86E-06 | 0.033 |
| Beryllium | 9.14E-07 | 4.00E-06 | 9.17E-07 | 4.02E-06 | 2.41E-09 | 1.05E-08 | 2.80E-05 |
| Cadmium | 8.38E-05 | 3.67E-04 | 8.40E-05 | 3.68E-04 | 2.21E-07 | 9.66E-07 | 3.70E-06 |
| Chromium III | 8.75E-05 | 3.83E-04 | 8.77E-05 | 3.84E-04 | 2.30E-07 | 1.01E-06 | 3.30E-02 |
| Chromium VI | 1.92E-05 | 8.41E-05 | 1.93E-05 | 8.43E-05 | 5.05E-08 | 2.21E-07 | 5.60E-07 |
| Cobalt | 6.40E-06 | 2.80E-05 | 6.42E-06 | 2.81E-05 | 1.68E-08 | 7.38E-08 | 0.0033 |
| Copper | 6.48E-05 | 2.84E-04 | 6.49E-05 | 2.84E-04 | 1.70E-07 | 7.47E-07 | 0.013 |
| Manganese | 2.90E-05 | 1.27E-04 | 2.90E-05 | 1.27E-04 | 7.62E-08 | 3.34E-07 | 0.067 |
| Mercury | 1.98E-05 | 8.68E-05 | 1.99E-05 | 8.70E-05 | 5.21E-08 | 2.28E-07 | 0.001 |
| Molybdenum | 8.38E-05 | 3.67E-04 | 8.40E-05 | 3.68E-04 | 2.21E-07 | 9.66E-07 | 0.333 |
| Nickel | 1.60E-04 | 7.01E-04 | 1.60E-04 | 7.03E-04 | 4.21E-07 | 1.84E-06 | 2.70E-05 |
| Selenium | 1.83E-06 | 8.01E-06 | 1.83E-06 | 8.03E-06 | 4.81E-09 | 2.11E-08 | 0.013 |
| Zinc | 2.21E-03 | 9.68E-03 | 2.22E-03 | 9.70E-03 | 5.82E-06 | 2.55E-05 | 0.667 |
| Nitrous oxide | 1.68E-01 | 7.34E-01 | 1.68E-01 | 7.36E-01 | 4.41E-04 | 1.93E-03 | 6 |
| PAH Total | 8.69E-07 | 3.80E-06 | 8.71E-07 | 3.81E-06 | 2.29E-09 | 1.00E-08 | 9.10E-05 |

[1] – Based on the Nebraska boiler combusting 100 percent natural gas.

[2] – Based on the Nebraska boiler combusting a natural gas/biogas fuel mixture.

[3] – Screening Emission Levels from IDAPA 58.01.01.585 and IDAPA 58.01.01.586.

## TABLE 5-1

## SIMPLOT-ABERDEEN FACILTIY $SO_2$ POINT SOURCE RELEASE PARAMETERS

Simplot – Aberdeen
Aberdeen, Idaho

| Operating Scenario [1] | Source | Flow Rate (acfm) | Exit Velocity (m/s) | Stack Diameter (ft) | Exit Temp. (°F) | Stack Height (ft) |
|---|---|---|---|---|---|---|
| 1 | Neb. Boiler [2] | 26,940 | 8.6 | 4.5 | 350 | 55 |
| | CE [2] | 0 | 0.0 | 2.0 | 70 | 38.8 |
| 2 | Neb. Boiler [2] | 13,470 | 4.3 | 4.5 | 350 | 55 |
| | CE [2] | 8,813 | 14.25 | 2.0 | 70 | 38.8 |
| 3 | Neb. Boiler [2] | 0 | 0.0 | 4.5 | 350 | 55 |
| | CE [2] | 17,627 | 28.5 | 2.0 | 70 | 38.8 |
| All FIA Modeling Scenarios | Flare [3] | 4,314 | 20 | 0.36 | 1,832 | 21.2 |
| | Hot Water Heater [4] | 1,302 | 8.41 | 0.31 | 300 | 20 |
| | Dryer Stack 1 [5] | 16,038 | 25.9 | 0.61 | 92 | 25.9 |
| | Dryer Stack 2 [5] | 16,038 | 25.9 | 0.61 | 92 | 25.9 |
| | Dryer Stack 3 [5] | 16,038 | 25.9 | 0.61 | 92 | 25.9 |
| | Dryer Stack 4 [5] | 16,038 | 25.9 | 0.61 | 92 | 25.9 |
| | Plant Vent 1 | NA | 0.001 | 0.001 | 105 | 19.5 |
| | Plant Vent 2 | NA | 0.001 | 0.001 | 105 | 19.5 |
| | Plant Vent 3 | NA | 0.001 | 0.001 | 105 | 19.5 |
| | Plant Vent 4 | NA | 0.001 | 0.001 | 105 | 19.5 |
| | Plant Vent 5 | NA | 0.001 | 0.001 | 105 | 19.5 |
| | Plant Vent 6 | NA | 0.001 | 0.001 | 105 | 19.5 |

CE = Condensing Economizer; ACFM = Actual Cubic Feet per Minute

1 Operating Scenario 1: 100 percent of Nebraska boiler exhaust through traditional boiler economizer

Operating Scenario 2: 50 percent of Nebraska boiler exhaust through traditional boiler economizer and 50 percent through condensing economizer

Operating Scenario 3: 100 percent of Nebraska boiler exhaust through condensing economizer.

2 Nebraska Boiler and condensing economizer exhaust flow rate calculations based on five percent excess combustion air. See Appendix B for flow rate calculations. Exit temperatures are typical for operation of a regular economizer and a condensing economizer.

3 Flare release parameters calculated using EPA Guidance Document: EPA-450/4-88-010 (Screening Procedures for Estimating the Air Quality Impact of Stationary Sources).

4 Hot water heater exhaust flow rate calculation based on three percent excess combustion air. See Appendix B for flow rate calculations. The hot water heater exhaust temperature is an engineering estimate.

5 Dryer Line 1 exhaust flow rates are based on the fan design capacity for plant operations and exhaust temperatures are based on field measurements by plant engineers.

**TABLE 5-2**

**SIMPLOT-ABERDEEN STRUCTURE HEIGHTS**

Simplot – Aberdeen
Aberdeen, Idaho

| Structure | Height AGL (feet) | Height AGL (meters) |
|---|---|---|
| COMP. Building | 23.3 | 7.1 |
| Boiler Room | 24.8 | 7.5 |
| Maintanence Shop | 20.2 | 6.1 |
| Parts Room | 22.0 | 6.7 |
| Engineering Office | 19.0 | 5.8 |
| Water Storage Tank | 32.0 | 9.8 |
| Water Tank Room | 19.0 | 5.8 |
| Chemical Building | 19.0 | 5.8 |
| Pump House | 19.0 | 5.8 |
| Raw Storage #1 | 22.0 | 6.7 |
| Main Production Building | 19.0 | 5.8 |
| Freeze Packing | 33.1 | 10.1 |
| Dry Warehouse | 19.0 | 5.8 |
| Cold Storage | 19.0 | 5.8 |
| Raw Receiving | 28.9 | 8.8 |
| Rail Road Building | 19.0 | 5.8 |
| Waste Plant | 29.9 | 9.1 |
| Clarifier Building | 29.9 | 9.1 |
| Digester Building | 24.0 | 7.3 |
| Influent Building | 18.0 | 5.5 |
| Conditioning Tank | 14.1 | 4.3 |
| Mag. Hydrox. Tank | 44.9 | 13.7 |

AGL = Above Ground Level

## TABLE 5-3

## SIMPLOT-ABERDEEN NEBRASKA BOILER BIOGAS BURNER PTC MODELING RESULTS

Simplot – Aberdeen
Aberdeen, Idaho

Concentrations are in micrograms per cubic meter (μg/m$^3$)

| Pollutant | Averaging Time | Maximum Concentration for Project [1] | SCL [2] | Maximum Concentration for Facility [3] | Background Concentration [4] | Maximum Aberdeen plus Background | NAAQS |
|---|---|---|---|---|---|---|---|
| $SO_2$ | 3-hour | 104.54 | 25 | 445 | 34 | 479 | 1,300 |
| | 24-hour | 20.00 | 5 | 150 | 26 | 176 | 365 |
| | Annual | 3.18 | 1 | 16 | 8 | 24 | 80 |

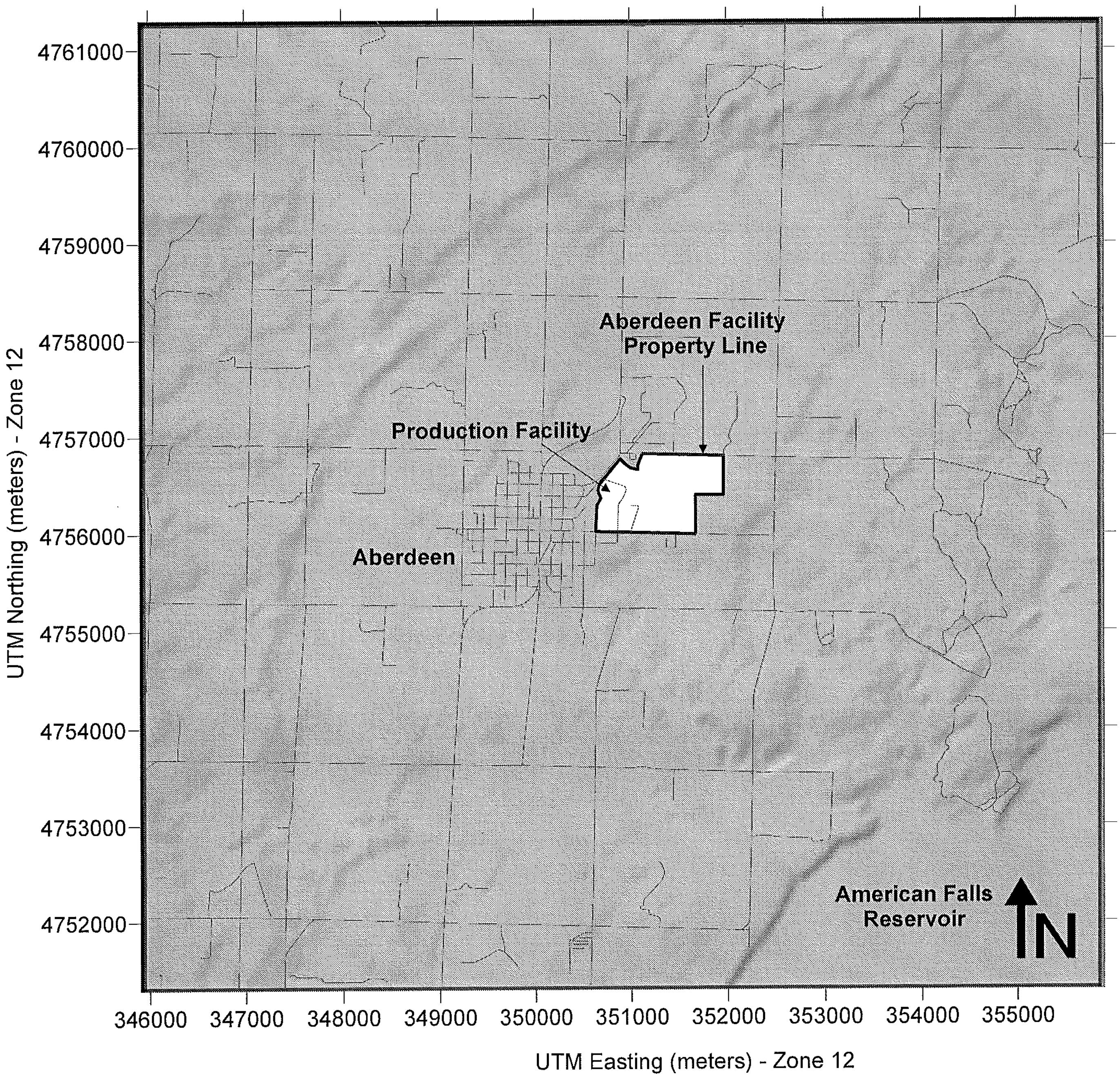
1 – Highest AERMOD-predicted concentrations resulting from the three Nebraska boiler modeling scenarios.

2 – Significant Contribution Levels from IDAPA 58.01.01.006.102

3 – Highest concentrations from three Nebraska boiler modeling scenarios including all SO2 emission units at the Aberdeen facility.

4 – Background concentrations for the modeling analysis were taken from the *IDEQ Background Concentrations for Use in New Source Review Dispersion Modeling* memo, for Rural Agricultural Regional Category (March 14, 2003).

# FIGURES

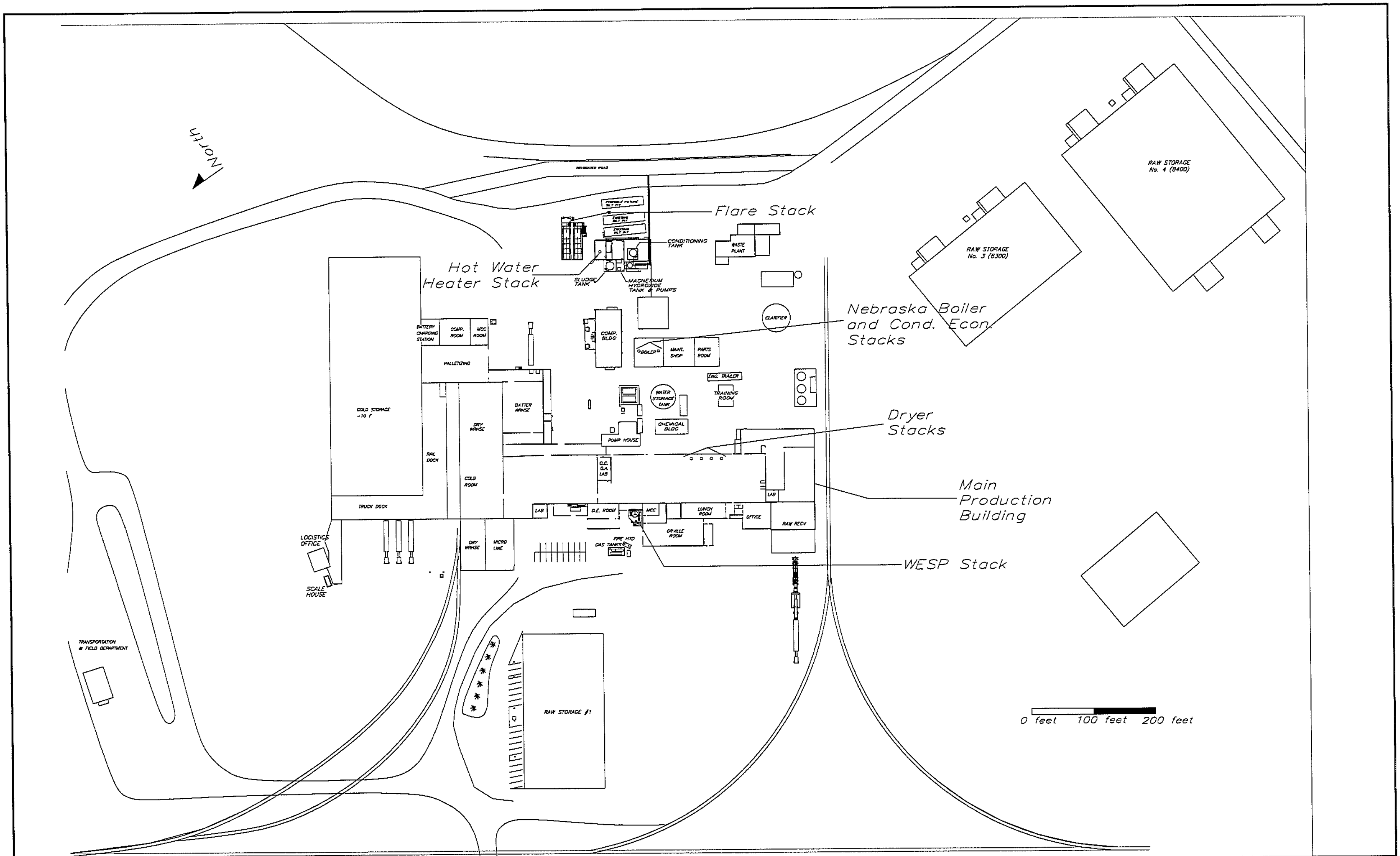



GEOMATRIX

SIMPLOT-ABERDEEN SITE MAP
Nebraska Boiler Biogas Burner PTC Application
Aberdeen, Idaho

Project No.
014018.000

Figure
1-1

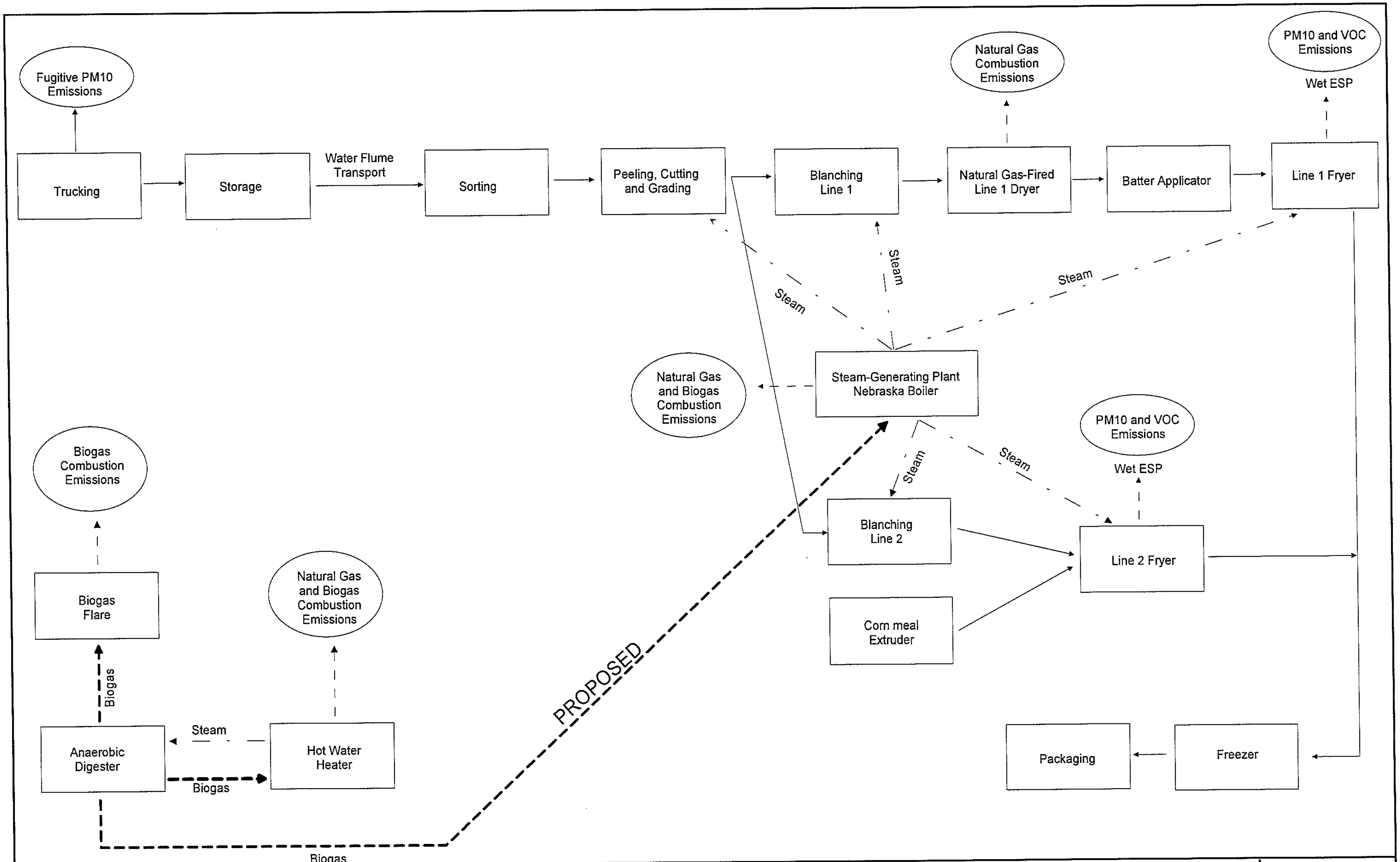



GEOMATRIX

SIMPLOT-ABERDEEN PLOT PLAN
Nebraska Boiler Biogas Burner PTC Application
Aberdeen, Idaho

Project No. 014018.000

Figure 1-2

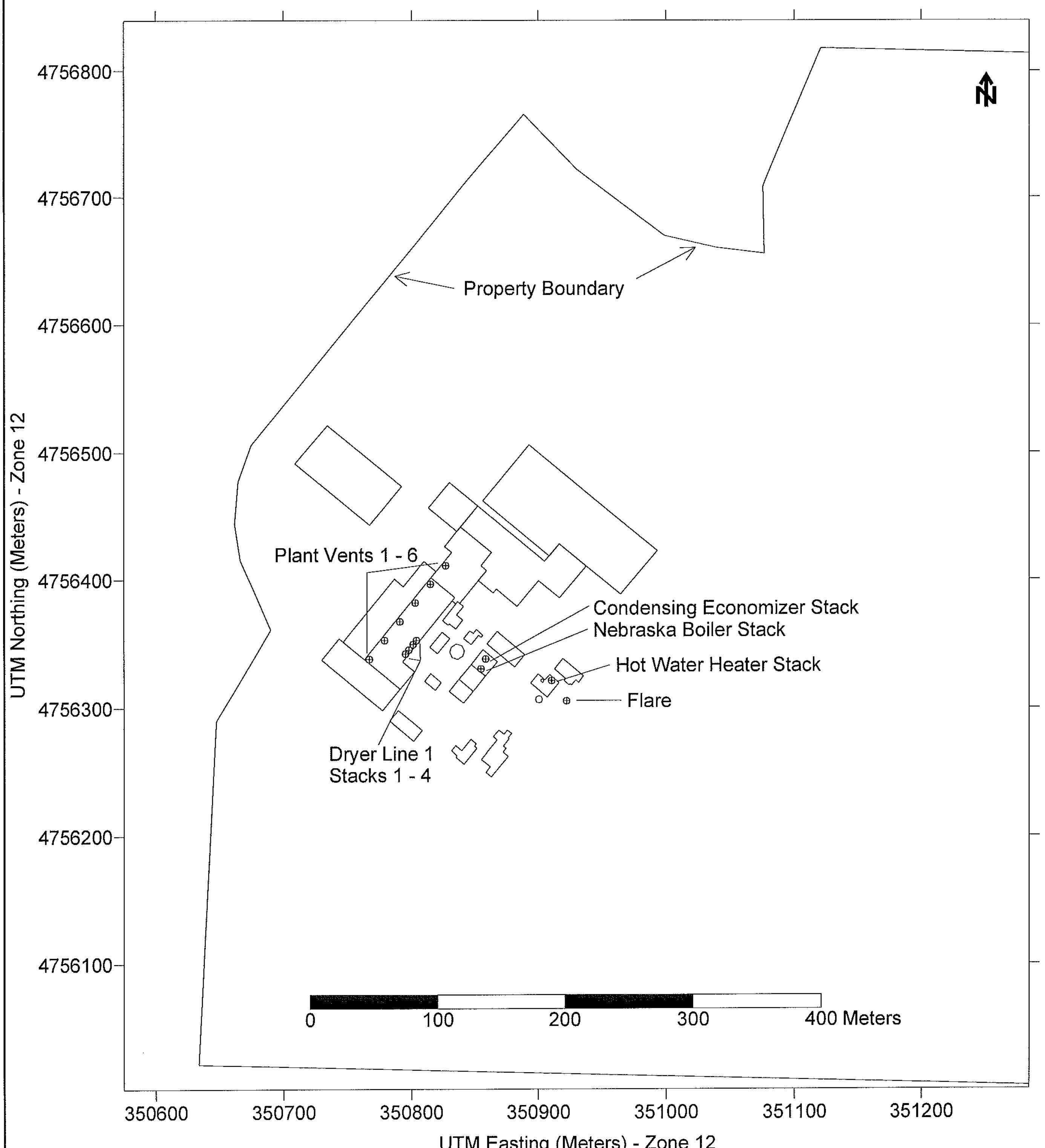



GEOMATRIX

SIMPLOT-ABERDEEN PROCESS FLOW DIAGRAM
Nebraska Boiler Biogas Burner PTC Application
Aberdeen, Idaho

Project No.
014018.000

Figure
2-1

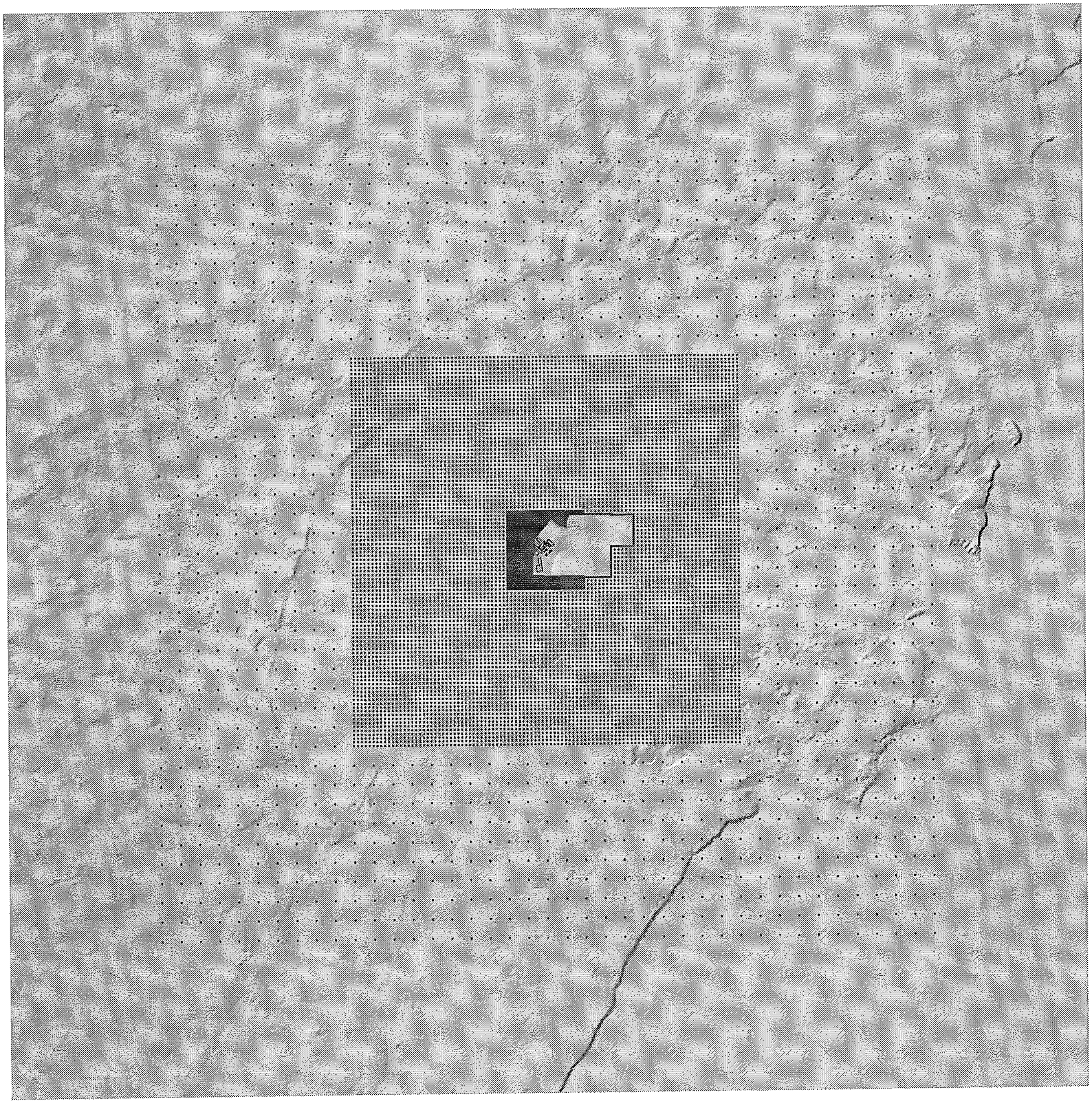



GEOMATRIX

SIMPLOT-ABERDEEN FACILITY $SO_2$ POINT SOURCE MAP
Nebraska Boiler Biogas Burner PTC Application
Aberdeen, Idaho

Project No. 014018.000

Figure 5-1



GEOMATRIX

SIMPLOT-ABERDEEN FINAL RECEPTOR LOCATIONS
Nebraska Boiler Biogas Burner PTC Application
Aberdeen, Idaho

Project No.
014018.000

Figure
5-2